

(B) Remarks

Upon entry of the foregoing amendments, claims 1-77 are pending in this application. Amendments have been made to the specification primarily to replace attorney docket numbers with patent application numbers, and in some instances, to correct an application's title. Claims 34, 37, 38, 39, 40 and 63 were amended to correct identification of claim elements or steps, as shown in the marked up version of the amendments. Applicants assert that no new matter has been added. Applicants request that the above amendment be entered prior to examination of this application.

Conclusion

Favorable consideration of all pending claims is respectfully requested. The Examiner is invited to telephone the undersigned representative with any questions or comments or if he believes that an interview might be useful for any reason.

Respectfully submitted,

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(C) Version with markings to show changes made

The following is a marked up version of the amendments to the specification, with deletions shown by brackets([...]), and additions shown by underline.

In the Specification:

- The paragraph beginning at page 28, line 25.

The teachings of the present invention can be combined with the vector modulation scheme disclosed in commonly owned and concurrently filed U.S. Patent Application No. [_____, (Attorney Docket No. 4115), entitled "System and Method for Impulse Radio Vector Modulation," (Attorney Docket No. 4115)] 09/538,519, entitled "Vector Modulation System and Method for Wideband Impulse Radio Communications," and disclosed in U.S. Provisional Application No. 60/169,765, filed December 9, 1999, entitled, "System and Method for Impulse Radio Vector Modulation," each of which is incorporated herein by reference in its entirety. For example, in vector modulation, each pulse is modulated into one of a plurality of different time positions spanning a cycle of a pulse interval. Using the teachings of the present invention, each vector modulated (i.e., time positioned) pulse can be one of two types of pulses (i.e., a first type of pulse, and a second type of pulse that is substantially the inverse of the first type of pulse). In another example, each vector modulated pulse can be one of four types of pulses (i.e., a first type of pulse, a delayed first type of pulse, a second type of pulse that is substantially the inverse of the first type of pulse, and a delayed second type of pulse that is substantially the inverse of the delayed first type of pulse). The result is that additional data states, and thus faster data speeds, can be realized through such a combination of modulation schemes.

- The paragraph beginning at page 43, line 1:

The impulse radio receivers of the present invention use multiple correlators, wherein one or more correlators are used to detect data and one or more correlators are used to synchronize the receiver with a received impulse radio signal. Additional details and uses of multiple correlators are disclosed in commonly owned and concurrently filed U.S. Patent Application No. [_____ (Attorney Docket No. 1659.0940000)] 09/537,264, entitled "System and Method Utilizing Multiple Correlator Receivers in an Impulse Radio System," which is incorporated herein by reference in its entirety.

- The paragraph beginning at page 43, line 9:

The impulse radio receivers of the present invention lock onto and acquire impulse radio signals. In one embodiment, this can be accomplished by comparing a template pulse train with a received impulse radio signal to obtain a comparison result, performing a threshold check of the comparison result, and locking on the received impulse radio signal if the comparison result passes the threshold check. Additionally, a quick check using the template pulse train and an additional received impulse radio signal can be performed. Further, a synchronization check of a further received impulse radio signal can be performed. Moreover, a command check of command data of the impulse radio signal can be performed. Additional details of systems and methods for fast locking and acquiring impulse radio signals are disclosed in commonly owned and concurrently filed U.S. Patent Application No. [_____ (Attorney Docket No. 28549-150964)] 09/538,292, entitled "System for Fast Lock and Acquisition of Ultra-Wideband Signals," which is incorporated herein by reference in its entirety.

- The paragraph beginning at page 46, line 28:

Methods of implementing multiple data states can also be found in commonly owned U.S. Patent Application No. [_____] (Attorney Docket No. 4115) 09/538,519, entitled "Vector Modulation System and Method for Wideband Impulse Radio Communications," which has been incorporated by reference above.

- The paragraph beginning at page 71, line, 19:

Further details and examples of lock loops and gain control can be found in commonly owned related U.S. Patent Application No. [_____] entitled "System and Method for Vector Modulation" (Attorney Docket No. 4115) 09/538,519, entitled "Vector Modulation System and Method for Wideband Impulse Radio Communications," and U.S. Patent Application No. [_____] (Attorney Docket No. 28549-150946) 09/538,292, entitled "System and Method for Impulse Radio Acquisition and Lock", both of which have been incorporated by reference above.

In the Claims:

The following is a marked up version of prior pending claims with deletions shown by brackets([..]), and additions shown by underline.

34. (once amended) A method of receiving an impulse radio signal, comprising the steps of:

- a. receiving a periodic timing signal;
- b. producing a timing trigger signal using at least said periodic timing signal;
- c. producing a template signal using said timing trigger signal;
- [e]d. producing a delayed template signal using said timing trigger signal;
- [f]e. producing a first correlator output signal by correlating a received impulse radio signal with said template signal;
- [g]f. producing a second correlator output signal by correlating said received impulse radio signal with said delayed template signal;
- [h]g. producing a data signal based on said first correlator output signal and said second correlator output signal;
- [i]h. producing a time base adjustment signal based on said data signal, said first correlator output signal and said second correlator output signal; and
- [j]i. using said time base adjustment signal to synchronize at least one of said periodic timing signal and said timing trigger signal with said received impulse radio signal.

37. (once amended) The method of claim 34, wherein step [h.]g. comprises the steps of:

- (i) producing, based on said first correlator output signal and said second correlator output signal, a first data state signal corresponding to a first data state, a second data state signal corresponding to a second data state, a third data state signal corresponding to a third data state, and a forth data state signal corresponding to a fourth data state; and
- (ii) determining which of said first data state signal, said second data state signal, said third data state signal, and said forth data state signal is greatest.

38. (once amended) The method of claim 34, wherein step [h.]g. comprises:

- (i) producing, based on said first correlator output signal and said second correlator output signal, a plurality of first data state signals corresponding to a first data state, a plurality of second data state signals corresponding to a second data state, a plurality of third data state signals corresponding to a third data state, and a plurality of forth data state signals corresponding to a fourth data state;
- (ii) adding said plurality of first data state signals to produce a first data state sum;
- (iii) adding said plurality of second data state signals to produce a second data state sum;

- (iv) adding said plurality of third data state signals to produce a third data state sum;
- (v) adding said plurality of forth data state signals to produce a forth data state sum; and
- (vi) determining which of said first data state sum, said second state data state sum, said third data state sum, and said forth data state sum is greatest.

39. (once amended) The method of claim 34, wherein step [i.]h. comprises:

- (i) producing, based on said first correlator output signal and said second correlator output signal, a first timing adjustment increment, a second timing adjustment increment, a third timing signal adjustment increment, and forth timing adjustment increment; and
- (ii) determining whether said timing adjustment signal should comprise said first timing adjustment increment, said second timing adjustment increment, said third timing adjustment increment, or said forth timing adjustment increment.

40. (once amended) The method of claim 14, wherein step [i.]h. comprises:

- (i) producing, based on said first correlator output signal and said second correlator output, a plurality of first timing adjustment increments, a plurality of second timing adjustment increments, a

plurality of third timing adjustment increments and a plurality of forth timing adjustment increments;

- (ii) adding said plurality of first timing adjustment increments to produce a first timing adjustment sum;
- (iii) adding said plurality of second timing adjustment increments to produce a second timing adjustment sum;
- (iv) adding said plurality of third timing adjustment increments to produce a third timing adjustment sum;
- (v) adding said plurality of forth timing adjustment increments to produce a forth timing adjustment sum; and
- (vi) determining whether said timing adjustment signal should comprise said first timing adjustment sum, said second timing adjustment sum, said third timing adjustment sum or said forth timing adjustment sum.

63. (once amended) A method of transmitting impulse radio signals, comprising the steps of:

- a. producing a first signal, a delayed first signal, a second signal, and a delayed second signal using periodic timing signal and an information signal;
- b. producing, in response to said first signal, a first impulse radio signal consisting of a first type of waveform;
- c. producing, in response to said delayed first signal, a delayed first impulse radio signal consisting of said first type of waveform;

- [e.]d. producing, in response to said second signal, a second impulse radio signal consisting of a second type of waveform, wherein said second type of impulse waveform is substantially an inverse of said first type of impulse waveform;
- [f.]e. producing, in response to said delayed second signal, a delayed second impulse radio signal consisting of said second type of waveform; and
- [g.]f. combining at least one of said first impulse radio signal and said delayed first impulse radio signal with at least one of said second impulse radio signal and said delayed second impulse radio signal, thereby producing a flip modulated impulse radio signal.